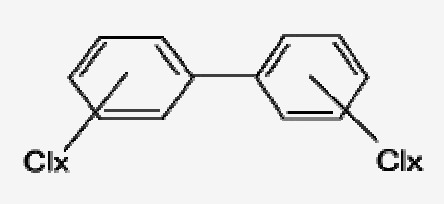
- PCB Informational Meeting -

Monitoring for PCBs as Part of TMDL Development and Implementation



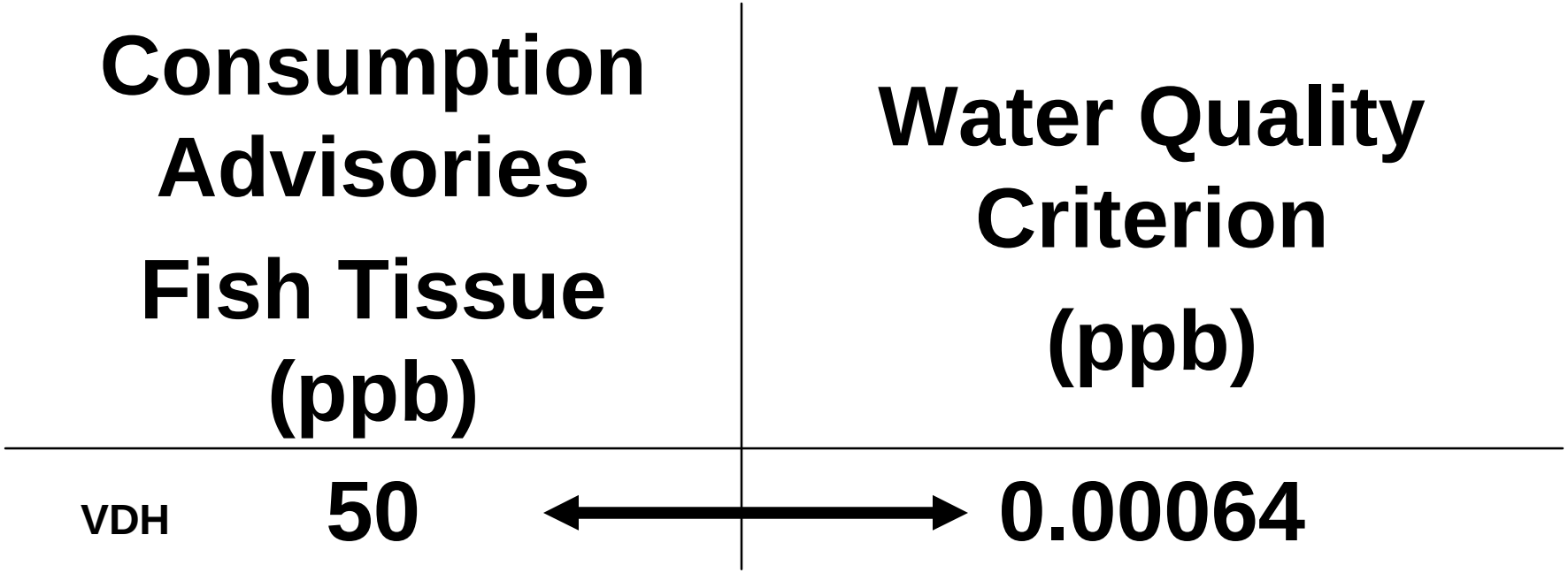
Mark Richards

Mark.richards@deq.virginia.gov

March 9, 2010

DEQ Virginia Department of Environmental Quality

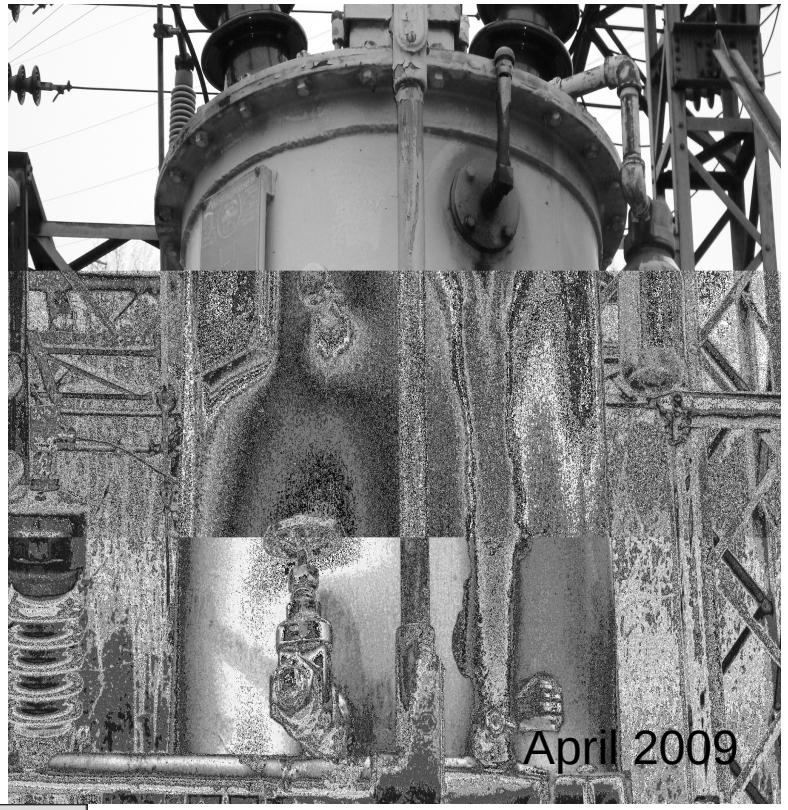
VA Regulatory Criteria
Total PCBs



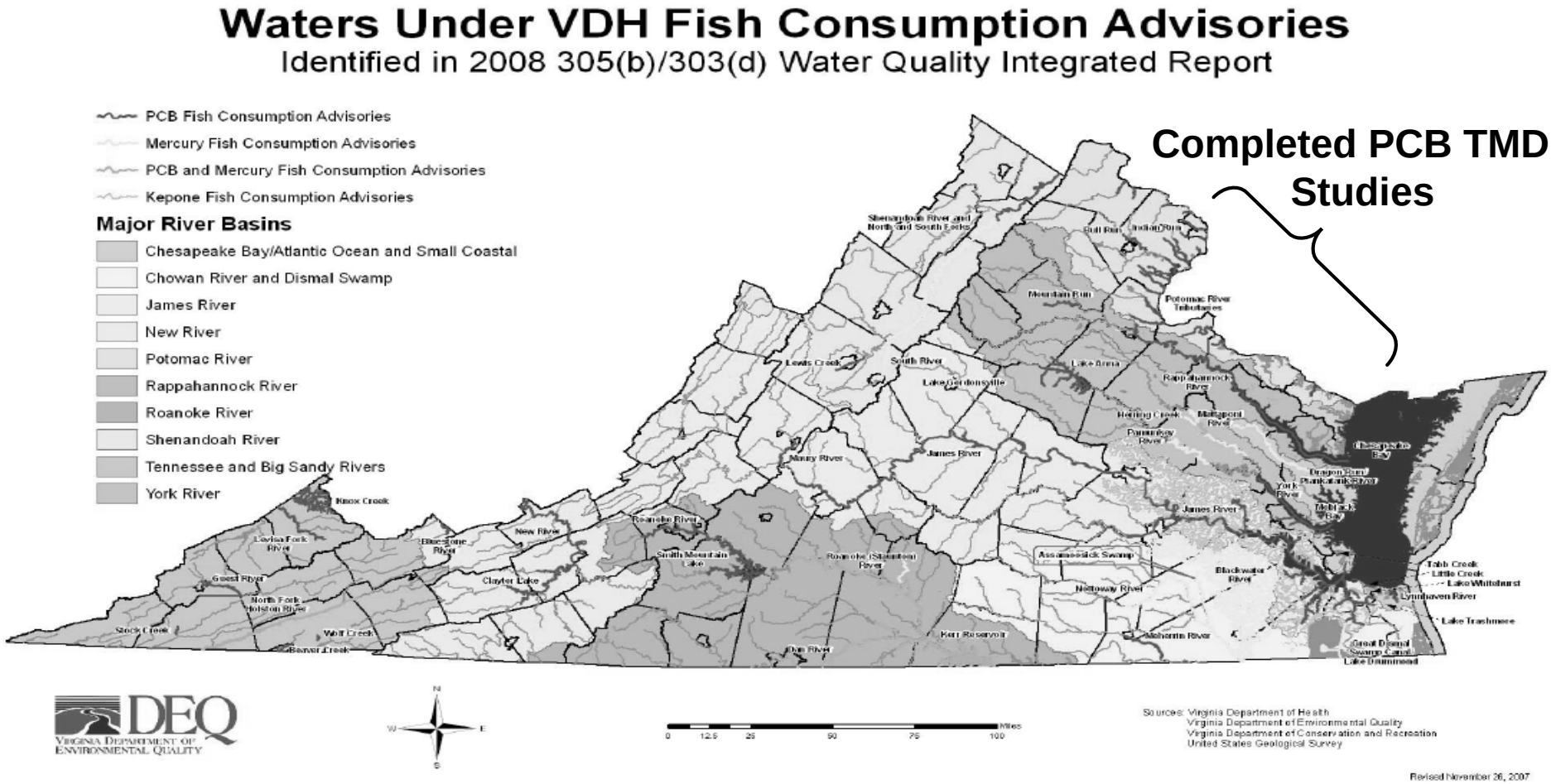
WQC represents concentration in the water column where the bioaccumulation of tPCBs in fish is minimized to be protective of fish consumption (by humans)

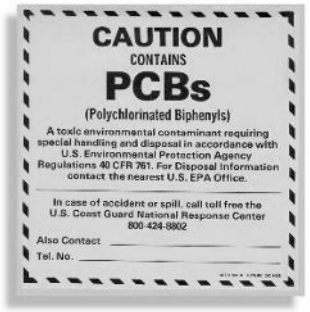
Meeting Overview - PCBs

- **Background**
  - **Why important?**
- **Legacy Pollutant**
- **TMDL Case Study**
- **Challenges**
- **PCB Point Source Guidance**



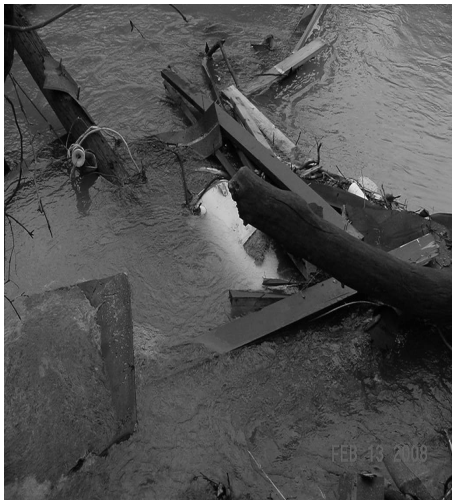
Problem Identification
- Fish Consumption Advisories -





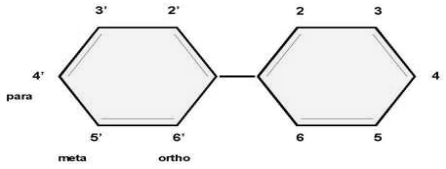
PCBs

- Estimated that > 1.5 Billion lbs. manufactured in the U.S. until 1977 - “Legacy Contaminant”
- Very stable and heat resistant
  - Persistent in environment
- Common uses:
  - Transformers, capacitors, hydraulic fluids, circuit breakers, PVC Products, carbonless copy paper, caulking material, paints, etc.



PCBs – What are They?

- Biphenyl molecule (1-10 chlorine atoms)



Structure of Polychlorinated Biphenyl (PCB) Molecule

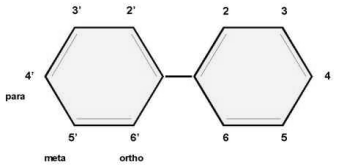
- 209 distinct PCB Compounds
- Regulated by VADEQ as Total PCB (tPCB) = 209 compounds summed
- Referred to as PCB Aroclors (Monsanto tradename) = mixture of PCB compounds

PCBs – Why Important?

- Bioaccumulates at low conc. (lipids)
- Suspected carcinogen
- Other toxicological effects (humans)
  - Immunotoxicity, reproduction and developmental, hepatotoxicity (liver), neurotoxicity, and chloracne
- Major Sources of Exposure (humans)
  - Consumption of contaminated fish
  - Inhalation (dust from contaminated sites)

WQC =

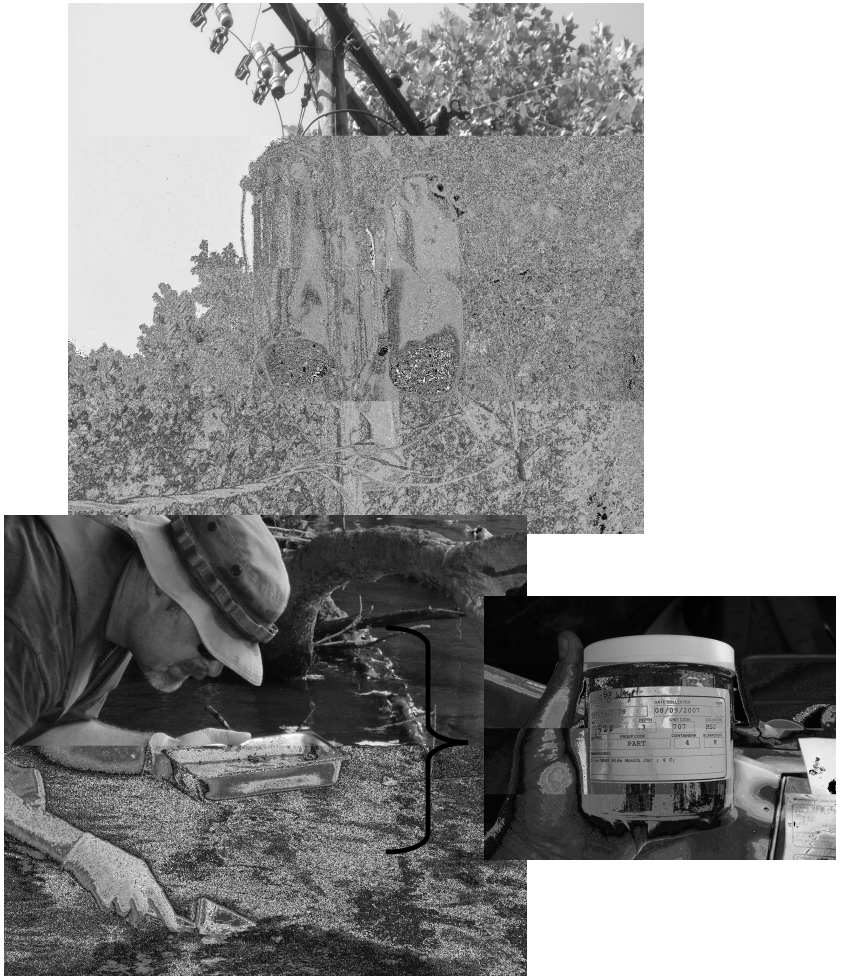
0.00064 ug/L



Structure of Polychlorinated Biphenyl (PCB) Molecule

PCBs - A Legacy Pollutant?

- Banned in late 70's
- Accumulate and persist in river sediments from historic releases
  - "Hot Spots"
- Generally not detected under VPDES Program



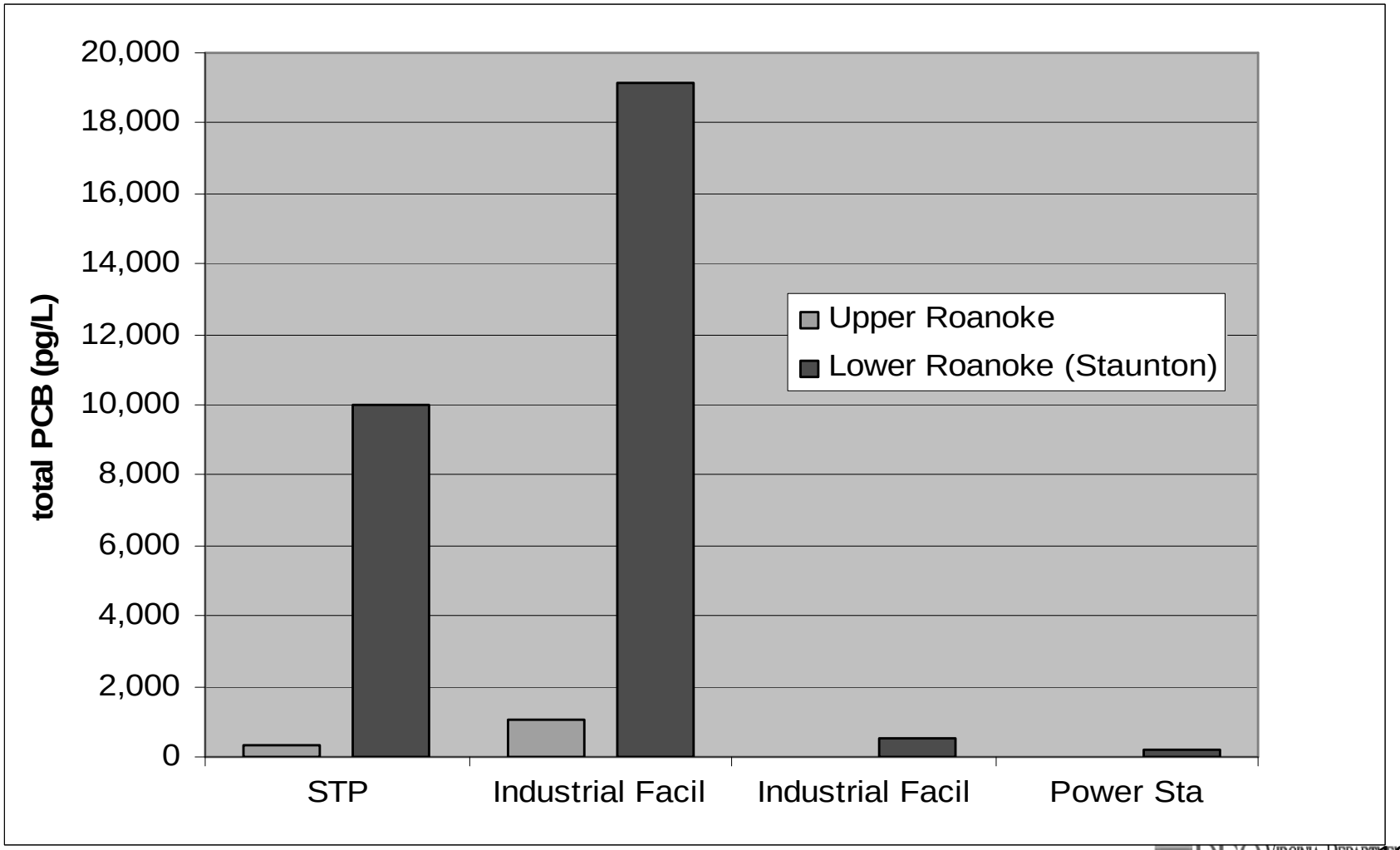
PCBs – Current Releases?

- PCBs used many years after banned
- Contaminated sites with active transport (non-point - e.g., CERCLA, RCRA, VRP, unknown)
- Point Sources
- Dielectric oils considered non PCB < 50 ppm
  - Fish advisories at 0.05 ppm
- Inadvertent production
  - Carbon + heat + chlorine
  - Up to 50 ppm allowed (TSCA)
- Atmosphere

NO PCBs

PCBs – Point Sources

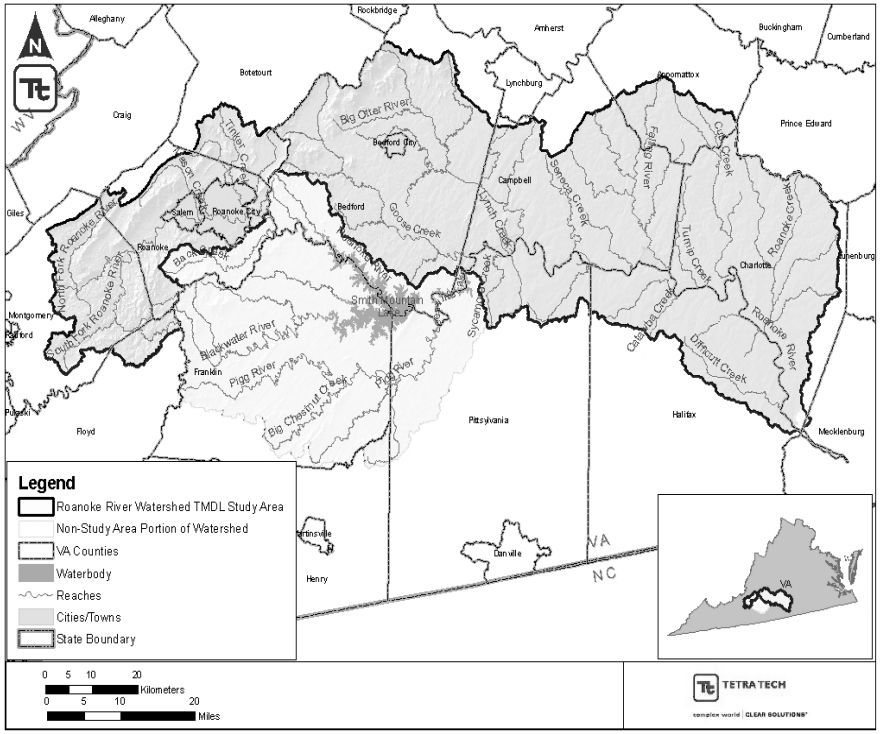
(Mean Concentrations)



Questions?

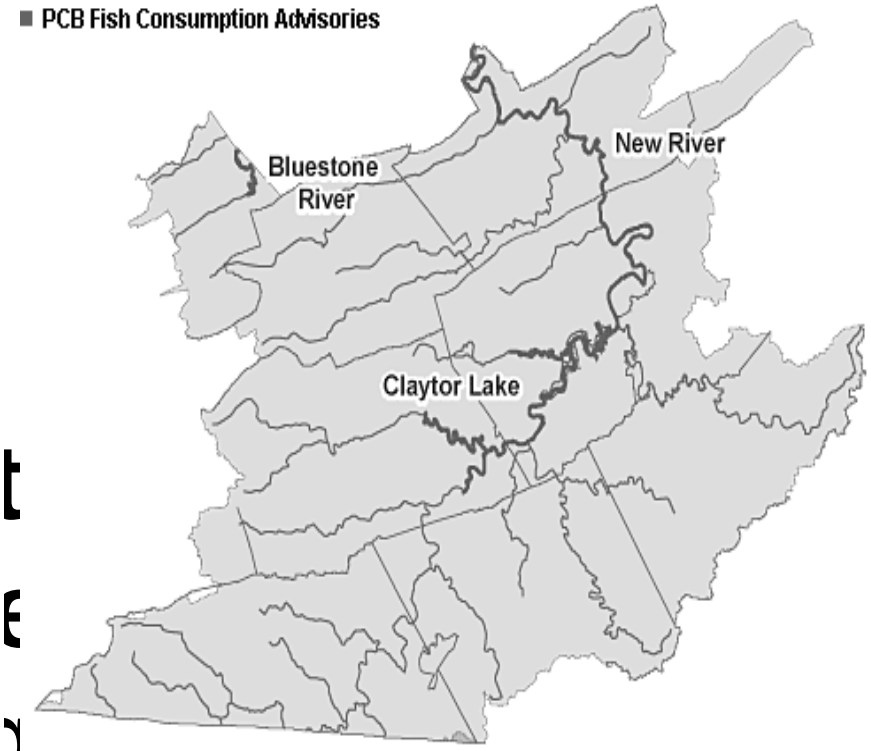
PCB TMDLs

Roanoke River



Completed December 2009
& beginning Implementation

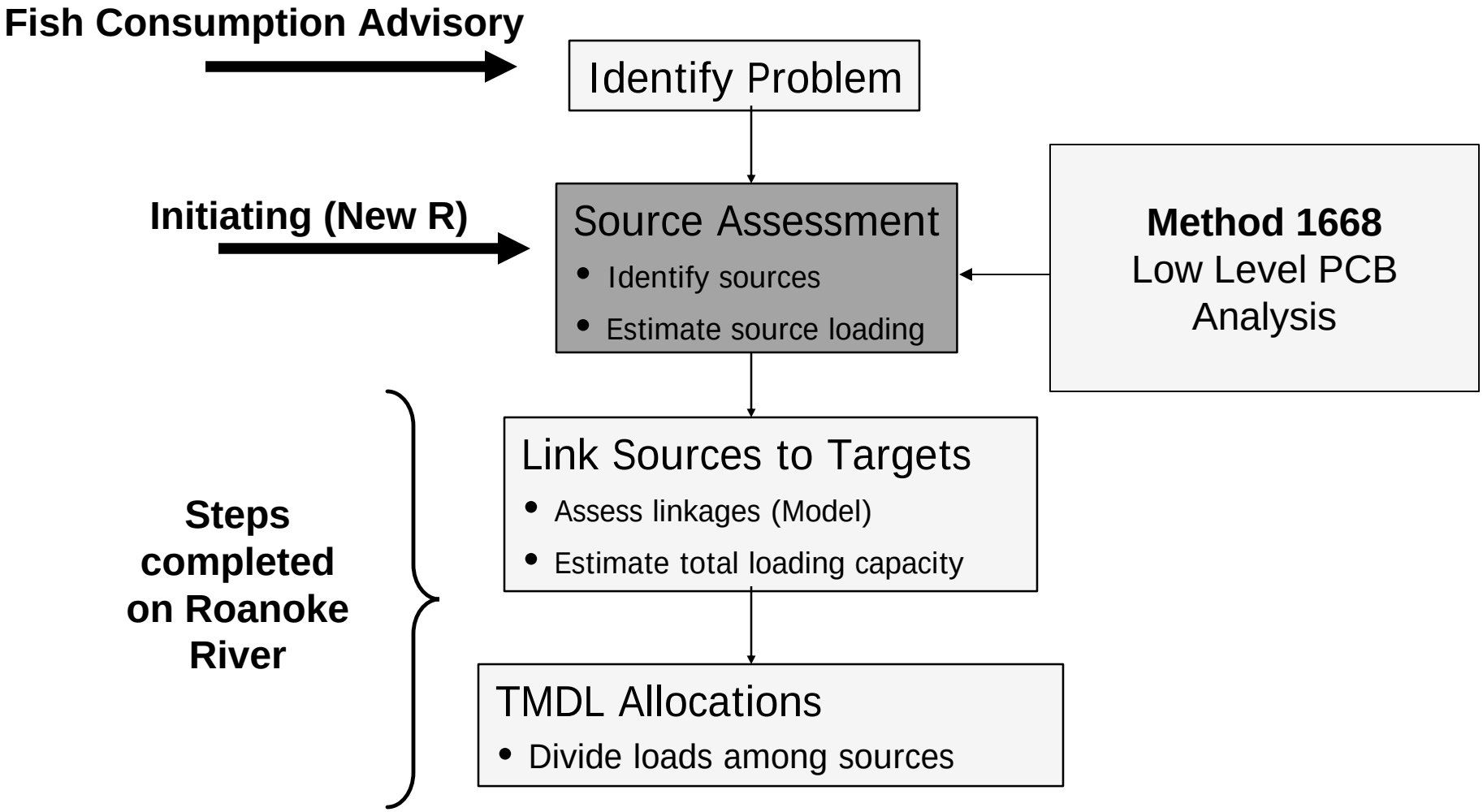
New River



Initiating Source Assessment

DEQ Virginia Department of Environmental Quality

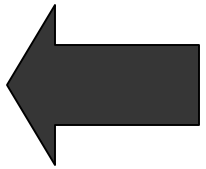
Components of TMDL Study



TMDL = Sum of WLA + Sum of LA + MOS

TMDL Source Assessment - Load Categories-

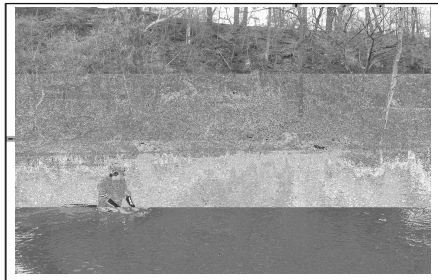
- Point Sources
  - WWTPs, Industry, Industrial SW, CSOs
  - MS4
- Non-Regulated Stormwater (Direct Drainage)
- Contaminated Sites
- Atmospheric Deposition
- River Sediment

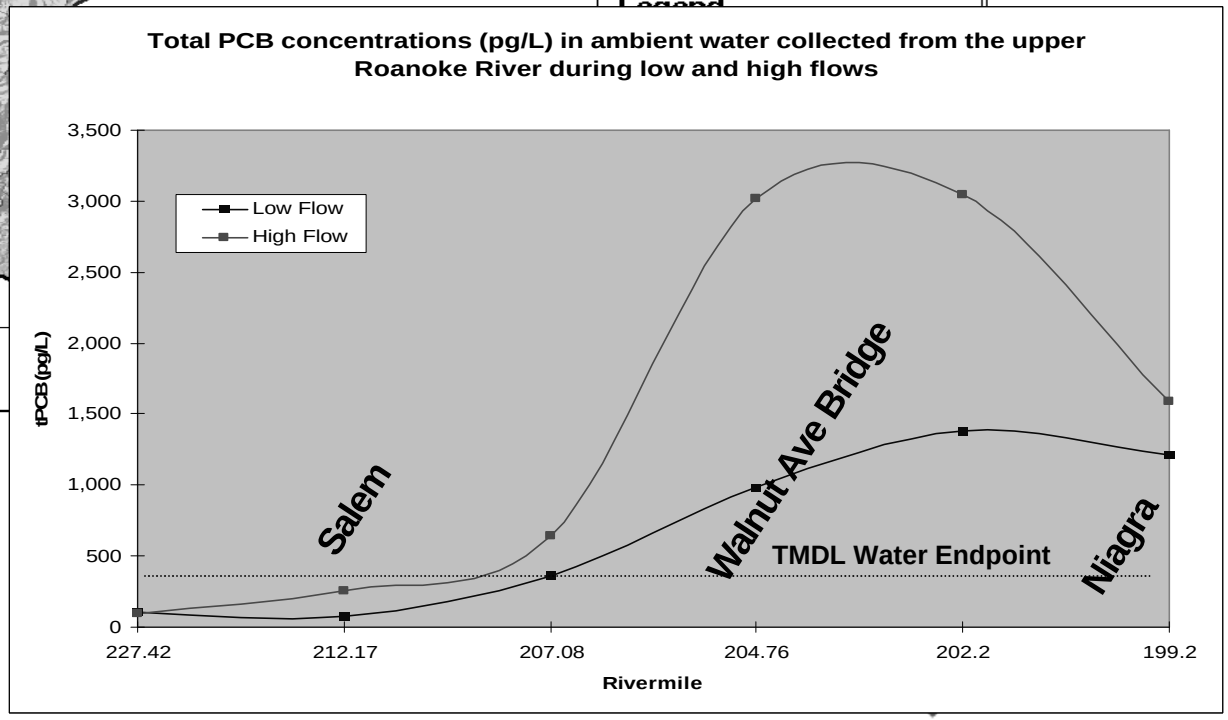


PCB TMDL Development

- Roanoke River TMDL Study
  - Ambient monitoring (low detection method)
  - Point Source monitoring (low detection method)
    - Significant point sources
      - Baseline PCB loads developed from real data
    - Industrial Stormwater sources (no data)
      - Baseline loads estimated
  - PCB Point Source Monitoring Guidance under development during Roanoke TMDL study
    - Used to identify potential SW sources

Upper Roanoke Watershed





Roanoke River TMDL

Average annual tPCBs loads for Roanoke River source categories

Source Category	Baseline (mg/yr)	WLA (mg/yr)	LA (mg/yr)	% Reduction
Upper Roanoke River				
VPDES Dischargers	17,665.8	28,267.1		-60.0
Individual Industrial/General Permits	6,827.4	5.3		99.9
MS4	109,622.4	332.7		99.7
Contaminated Sites	7,853.5		1.0	100.0
Urban background (unknown sites)	12,082.4		114.4	99.1
Atmospheric Deposition	8,862.5		8,419.4	5.0
Total	**162,914.1**	**28,605.0**	**8,534.8**	**77.2**

Roanoke River TMDL - WLA

Stream	Point sources			Stormwater dischargers			MS4s		
	Baseline (mg/yr)	WLA (mg/yr)	% Reduction	Baseline (mg/yr)	WLA (mg/yr)	% Reduction	Baseline (mg/yr)	WLA (mg/yr)	% Reduc-tion
Upper Roanoke River									
North Fork Roanoke River	10.7	17.8	-66.3	105.5	1.0	99.1	990.5	9.4	99.1
South Fork Roanoke River	68.4	228.6	-234.0	0.0	0.0	0.0	177.4	1.7	99.1
Masons Creek	0.0	0.0	0.0	5.9	0.1	99.1	950.6	9.0	99.1
Peters Creek	90.7	50.8	44.0	1.4	0.0	99.1	1,542.2	14.6	99.1
Tinker Creek	0.0	0.0	0.0	135.6	1.3	99.1	10,799.4	102.6	99.1
Wolf Creek	0.0	0.0	0.0	0.0	0.0	0.0	1,053.7	10.0	99.1
Unnamed Trib to Roanoke River	0.0	0.0	0.0	0.0	0.0	0.0	52.8	0.5	99.1
Roanoke River	17,495.9	27,969.9	-59.9	6,579.0	3.0	100.0	94,055.7	184.8	99.8
Upper Total	**17,665.8**	**28,267.1**	**-60.0**	**6,827.4**	**5.3**	**99.9**	**109,622**	**332.7**	**99.7**

Point Sources – Non-stormwater

- TMDL requirements:
  - Baseline or existing load condition
  - Waste Load Allocations (WLAs)

$$\text{Baseline PCB Condition (g/yr)} = \left[\text{PCB conc. ng/L}\right] * \left[\text{Ave Flow (mgd)}\right] * \text{Conv. Factor}$$

$$\text{TMDL WLA (g/yr)} = \left[\text{PCB Endpoint conc. conc. ng/L}\right] * \left[\text{Design Flow (mgd)}\right] * \text{Conv. Factor}$$

Point Sources – Industrial Stormwater Facilities

- Land based foot-print established (GIS)
- A PCB background soil conc. calculated for different land uses (contaminated sites or urban background)
  - Upper Roanoke urban background (6.8 ng/g)
- Model generated an est. PCB baseline load
  - Input includes local precipitation, area-weighted land use, and PCB soil concentration
- WLA assigned by model
  - Determined amount of PCB reductions necessary to meet TMDL water endpoint instream

PCB TMDL Implementation

- If baseline PCB load exceeds the TMDL WLA:
  - BMP WQBELs (40 CFR 122.44(k))
    - Numeric effluent limits considered infeasible
    - EPA accepted approach on Potomac River PCB TMDL
  - PCB monitoring (confirm above or below WLA)
  - Pollutant Minimization Plan
  - Adaptive Implementation
    - Objective to back-track source and not treat at end of pipe

Questions?

Point Sources

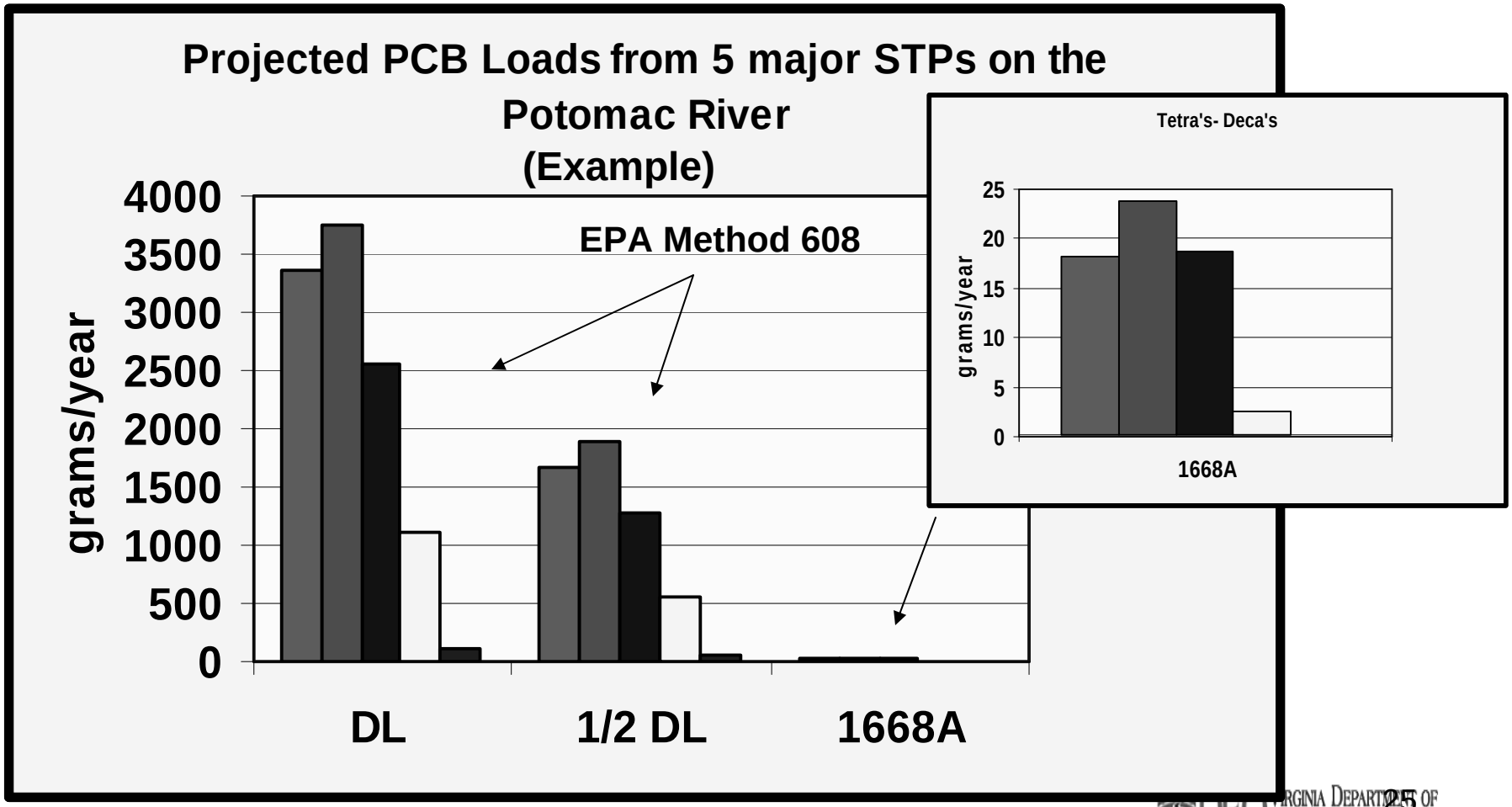
- Permitted dischargers generate PCB data under the VPDES Permit Program using EPA Method 608
  - Typical Comments/Questions
    - “PCBs have never been detected in my effluent.”
    - “Why has my facility been included (or being targeted) in the TMDL?”
    - “Why are permitted dischargers being asked to collect additional PCB data?”

Point Sources

TMDL Need - Establish Baseline Loading

- EPA Method 608 (Permit method)
  - PCBs rarely detected (MDL = 0.065 µg/L; QL = 0.5 µg/L) tPCB WQC = 0.00064 µg/L
  - Reported as Aroclors
- Options
  - No data = no load?
    - Not an option: existing load required by TMDL
  - Use assumptions (Method QL or DL)
  - Generate low level PCB data

Assumptions vs. Real Data



PCB Analytical Method

- EPA Method 1668, Revision B
  - High Resolution Gas Chromatography/ High Resolution Mass Spec
  - Analyzes 209 Congeners
  - Detection ≤ 5 pg/L per congener
  - Targets PCB concentrations that are relevant to fish

Guidance for Monitoring of Point Sources for TMDL Development Using Low Level PCB Method 1668

March 2009

http://www.deq.virginia.gov/tmdl/pcb.html

Need for PCB Monitoring Guidance

- All areas of the Commonwealth lacking PCB water data (ambient and effluent)
- DEQ has insufficient funding to perform PCB analysis for TMDL source categories
- Asks VPDES permit holders to generate the data
  - Provides a consistent, technical approach
  - Enables DEQ to focus on performing ambient water and sediment PCB analysis
    - Used for source assessment
    - Model fate and transport of PCBs

Point Source PCB Monitoring Guidance

Purpose is to establish procedures for implementing point source monitoring of PCBs in support of TMDL development.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Originated from data needs on the Potomac PCB TMDL. Similar to efforts used in New York (Panero *et al*., 2005), Delaware and New Jersey (DRBC 1998)

http://www.nyas.org/programs/harbor.asp

http://www.state.nj.us/drbc/regs/pcb-new.pdf

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Guidance Developmental History

2006 - DEQ Internal Development

2007 thru 2008 –

Technical Advisory Committee: Bluefield STP, City of Richmond, Dominion Resources, DCR, DMME, HRPDC, Navy, Southern Environmental Law Center, UOSA, U.S. Fish & Wildlife, VAWMA, VMA, Western VA Water Authority (6 meetings)

DEQ Internal Review (dynamic)

EPA Region III review (Fall 2008)

2009 - Finalized

Guidance Document

I. Introduction
II. Background
III. Authority
IV. Definitions
V. Procedure
   A. Facilities identified for monitoring
   B. Monitoring frequency
   C. Sample collection and analytical requirements
   D. Analytical laboratories
   E. PCB reporting requirements
   F. References
VI. Appendices

VADEQ RO Identifies Facilities Considered for PCB Monitoring (per PCB Guidance)

- Major (including CSOs) & minor municipals
- Industrial facilities (specific SIC codes)
- Industrial stormwater dischargers under individual or general permits (SIC codes)
  - Exemptions (case by case basis)
    - Minor municipals – document not a source
    - SW through a POTW or CSO or “no exposure”
    - Representative or identical outfalls
    - DEQ does not regulate MS4s (DCR)
      - Provides framework for PCB monitoring

Monitoring Frequency

Base flow (dry) and storm flow (wet) needed for load characterization

VPDES Facility				
Municipals		**Industrials**		
Major ≥ 1 MGD	**Minor < 1 MGD**	**Process wastewater only**	**Process wastewater with storm water**	**Storm water only**
2 wet + 2 dry	**1 wet + 1 dry**	**2 samples (storm event sampling not required)**	**1 dry + 1 wet**	**2 wet**

If PCB reductions unnecessary under a TMDL, there is no need for additional PCB monitoring

PCB Guidance Appendices

- Appendix C
  - Sampling options & “clean technique” protocol
- Appendix D
  - Analytical Requirements (EPA Method 1668)
  - Approved list of laboratories on website
- Appendix E
  - Data Submittal Requirements

Lessons Learned

- Samples must be collected as described in Appendix C
  - Since dealing with low level analysis, very easy to contaminate sample
  - Recommended sampling containers be obtained from laboratory
- If analysis is not performed in accordance with requirements specified in Appendix D, not worth running the analysis
  - Reporting levels not met

Cost Containment

- Analytical Costs
  - $700 - $1,200 per sample
  - Encourage partnerships between facilities
    - Samples run in batches of 20
    - Samples can be held under the proper conditions up to one year
    - Cost savings
  - Some laboratories are willing to coordinate analytical work among facilities

Virginia DEQ - TMDLs - PCB resources - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.deq.virginia.gov/tmdl/pcb.html

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- TMDL Home
- TMDL development
- TMDL implementation
- Geospatial data
- Chesapeake Bay TMDL
- PCB TMDLs
- TMDL ad hoc committee
- Additional information
- DEQ water programs

Resources for PCB TMDLs

Email: Charles Martin

- Guidance for Monitoring of Point Sources for TMDL Development Using Low-Level PCB Method 1668
- The VDEQ issued a statewide strategy in January 2005 to address PCB contamination in the waters of the Commonwealth: PCB Strategy Report
- PCB Laboratories
- Advisory Committee Meeting and PCB Guidance Materials
- Electronic Deliverable Data (EDD) files available for download in accordance with the PBC Point Source

Done

Questions?

Presentation & PCB Guidance Available at

http://www.deq.virginia.gov/tmdl/pcb.html

Mark.richards@deq.virginia.gov